

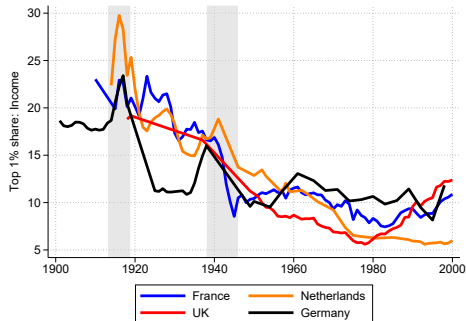
The Great Leveler According to HANK

Ralph Luetticke, Timothy Meyer, Gernot Müller, and Moritz Schularick

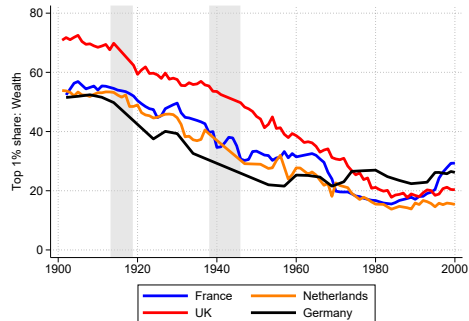
3rd KIEL-CEPR CONFERENCE ON GEOECONOMICS
Berlin, October 2024

Inequality during 20th century

(a) Top-1% Income Share



(b) Top-1% Wealth Share



“To a large extent, it was the chaos of war, with its attendant economic and political shocks, that reduced inequality in the twentieth century.” Piketty (2014)

The question: Does war reduce inequality and, if so, how?

Economic historians collected great deal of data/performed case studies

- Scheidel (2018) seminal account of war as **the great leveler** (one of four horsemen of leveling)
- However, recent work also stresses other explanations (Easterly 2019, Waldenström 2024)

We offer macroeconomic perspective

- General pattern of how war changes wealth and income inequality over time
- Structural account: **Heterogeneous Agent New Keynesian (HANK)** model

The paper

New historical data set

- Granular historical data on income, wealth, and the drivers of their distribution, such as taxation and wartime destruction
- Focus on advanced economies war sites (Federle et al 2024)

Results

- Income inequality declines strongly, capital-income share, too; wealth inequality much less
- Decline in capital share explains, all else equal, at most 50% of decline in income inequality
- HANK can fully rationalize decline of top income & capital share

Related literature

Inequality trends (Piketty and Saez, 2014; Roine and Waldenström, 2015)

- U.S.: Goldin and Margo (1992); Saez and Zucman (2016), **Germany**: Bartels (2019), **U.K.**: Alvaredo et al. (2018) , **France**: Garbinti et al. (2021), **Japan**: Moriguchi and Saez (2008), **Norway**: Aaberge and Atkinson (2010), **Netherlands**: Toussaint et al. (2022), countless others

War and inequality

- Heldring et al. (2022): no reduction in wealth inequality due to U.K. bombing
- Albers et al. (2022); Piketty (2003): Case studies for Germany and France

Macroeconomic consequences of wars and disasters

- Braun and McGrattan (1993); Barro (2006); Ursua and Barro (2010); Gabaix (2012); Gourio (2012); Nakamura et al. (2013); Farhi and Gabaix (2016); Auray and Eyquem (2019); Horn et al. (2020)

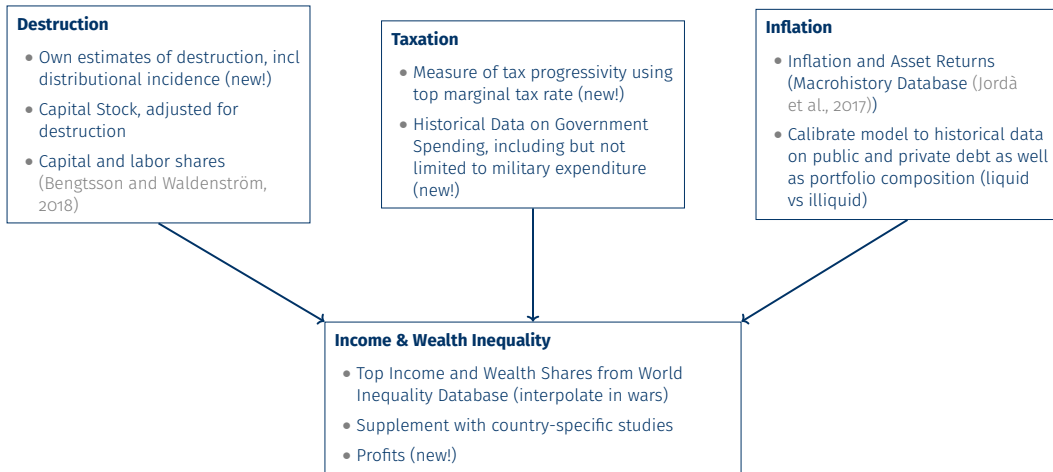
Data and sample: 1870–2020

War-site economies (baseline)

Country	Year	Destruction	Country	Year	Destruction
Finland	1939	7.36%	Japan	1944	25.61%
France	1914	11.00%	Netherlands	1940	7.00%
France	1940	23.00%	Norway	1940	8.05%
Germany	1914	5.00%	U.K.	1940	5.00%
Germany	1939	17.06%			

- Focus of historical literature, comparable wars, consistent data availability
- Check robustness with larger sample and non-sites in extension
- Destruction in percent of pre-war capital stock

Data – *Destruction, Taxation, Inflation*



Empirical Framework

Treat wars as shocks in local projection

- War: Combination of underlying structural shocks
- Casus belli classification supports exogeneity to pre-war economic conditions

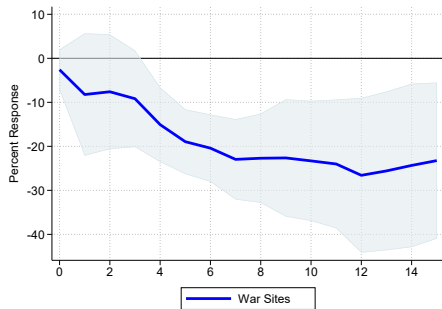
$$\log(y_{i,t+h}) - \log(y_{i,t-1}) = \alpha_i + \beta_h \text{War Start}_{i,t} + \gamma_h X_{i,t} + \varepsilon_{i,t+h} \quad h = 0 \dots 15,$$

- Left hand side is cumulative change in outcome up to $t + h$
- Control for 4 lags of dependent variable
- Robustness: Larger sample, 'quantitative' war shock, adjust interpolation, drop wars successively

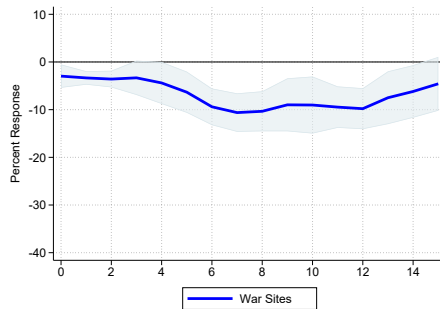
Inequality at the Top: Income vs Wealth

Response in percent of pre-war share

(a) Top 1 Income Share



(b) Top 1 Wealth Share

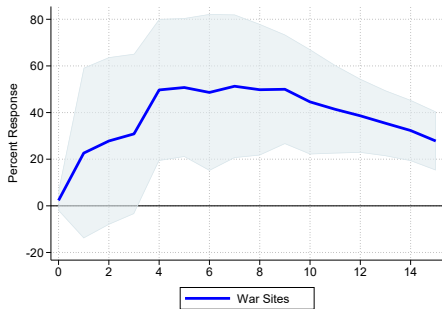


Robustness : [▶ Full Sample](#) [▶ Quantitative Measure](#) [▶ Different Interpolation](#) [▶ Drop Wars](#)

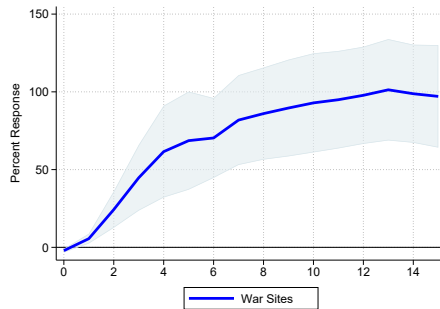
Top decile shows smaller reaction [▶ Top 10](#)

Channels: Inflation Surges and Taxation becomes Progressive

(a) Top Marginal Tax Rate

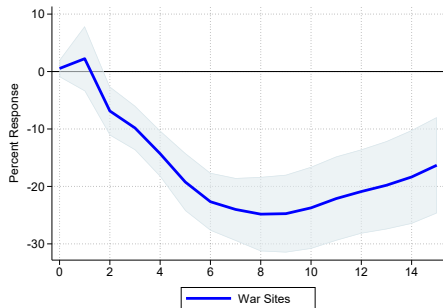


(b) Price level

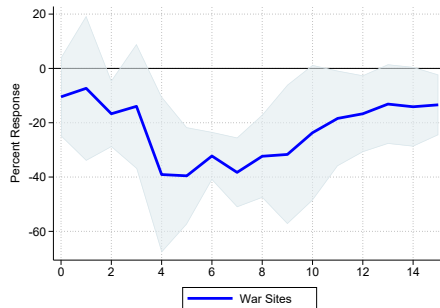


Channels: Capital Suffers during Wars

(a) Capital Stock



(b) Capital / Labor Share



Does drop in capital share explain decline in inequality?

Basic accounting framework (Meade 1964)

Share of top-1 percentile for arbitrary distribution of wealth K and income Y :

$$sh_{K,p} = \frac{K_p}{K}$$

$$sh_{Y,p} = \frac{Y_p}{Y} = \frac{sh_{L,p} \cdot wL + sh_{K,p} \cdot r \cdot K}{wL + rK}$$

Rewrite in terms of capital-labor share and assume, all else equal, decline by $D\%$

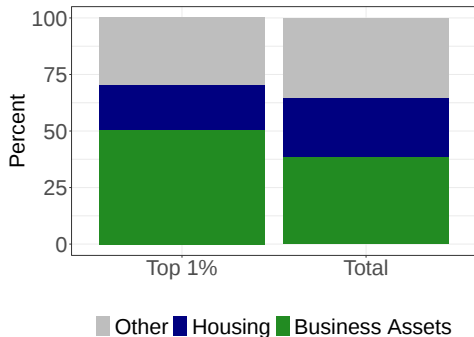
$$\underbrace{sh_{K,p}(D) = \frac{(1-D)rK_p/wL}{(1-D)rK/wL}}_{\text{Constant!}} = \frac{K_p}{K}$$

$$\underbrace{sh_{Y,p}(D) = \frac{sh_{L,p} + sh_{K,p} \cdot (1-D)rK/wL}{1 + (1-D)rK/wL}}_{\text{Falling in } D \text{ if } sh_{K,p} > sh_{L,p}}$$

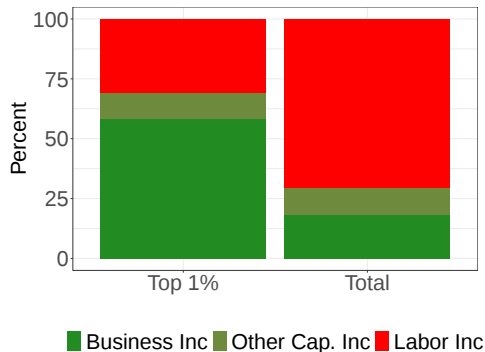
- Observed D is sufficient statistic for movements in top income shares
- Income share falls where capital income makes up for large fraction, namely at the top

An illustration based on French data

Portfolio composition



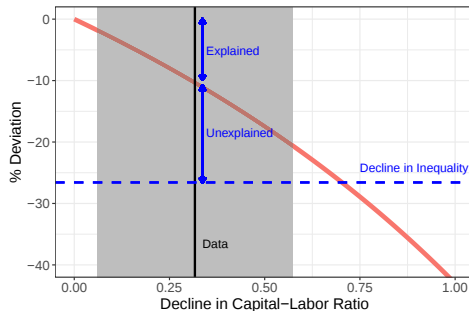
Income composition



- Wealth portfolio of top-1 not different from aggregate
- Capital income accounts for disproportionately large share of top-1 income

Impact of declining rK/wL on Top Percentile Share

Calibrate based on pre-war data & actual decline of rK/wL



- Explains up to 50% of actual decline
- Similar picture when adding capital losses higher for top 1 [▶ See](#)

HANK model: Structural interpretation of evidence

HA essential

- Agents heterogenous in wealth and income

NK features essential

- Monopolistic competition: pure rents (“profits”) also generate capital income
- Sticky prices: time variation in markups μ_t

Endogenous decline of capital-labor share

- Destruction of capital through “depreciation” shock
- Production Cobb-Douglas $Y_t = K_t^\alpha L_t^{1-\alpha}$
- Capital income incl profits relative to labor income fluctuates: $\frac{\alpha + (\mu_t - 1)}{1 - \alpha}$

HANK model based on Bayer Born Luetticke (2024): Overview

Households		Firms	Government
Obtain income	Trade Assets	Production	Policy
Wages • idiosyn. risk • taxes and transfers • sticky wages	Bonds • traded every period • = government issued + household borrowing	Intermediate goods prod. • rent capital and labor • competitive national markets	Monetary authority • Taylor rule • reacts to inflation and output deviations
Interest on bonds • set by monetary authority		Resellers • differentiate goods • set prices (sticky)	Fiscal authority • raises taxes • cyclical spending • issues debt
Illiquid capital • earns net MPK	Illiquid capital • trading friction: access position with some probability	Bundlers • CES production function	• a rule to stabilize debt in the long run
All non-wage rents • go to rich entrepreneurs		Capital goods producers • turn final into capital good	

The evidence seen through the lens of the model

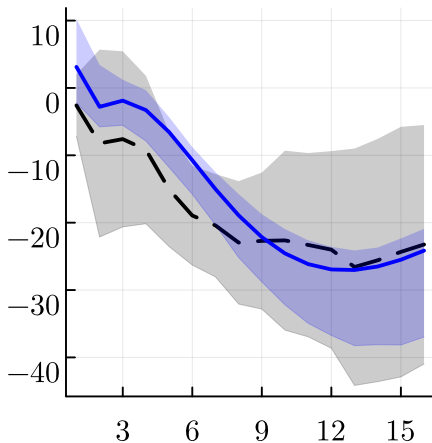
Bring model to data

- Fix parameters that determine steady state based on historical data
▶ Calibrated Parameters
- War as 3 shocks: depreciation, tax progressivity, inflation/monetary policy
- Estimate shock parameters via impulse response matching (Christiano et al 2010)
▶ Estimated Parameters

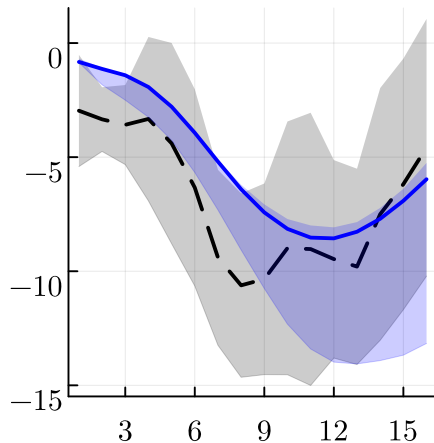
Tracks empirical impulse responses functions for reasonable parameter values

- In particular: decline of top income share **and** capital-labor share
- Quantify role of specific shocks/channels

Decline in Inequality

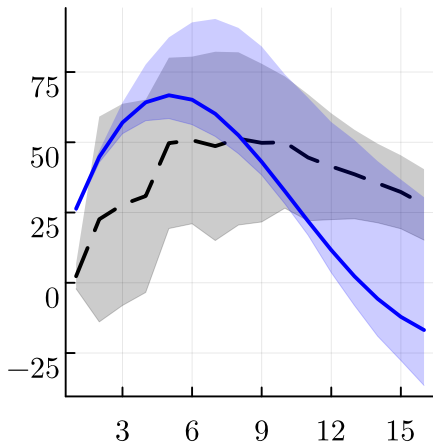


(a) Top 1 Income

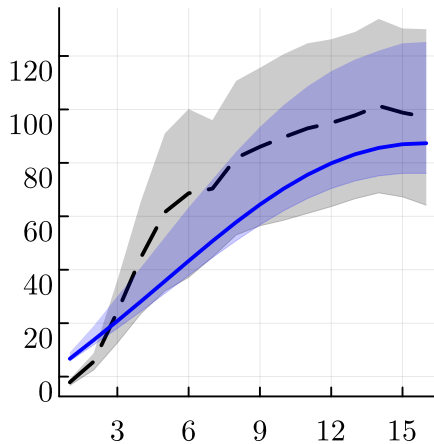


(b) Top 1 Wealth

Taxation and Inflation

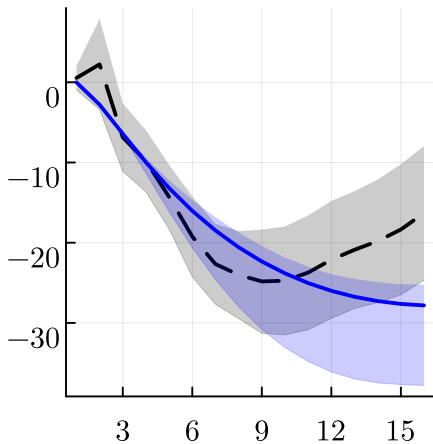


(a) Top Marginal Tax Rate

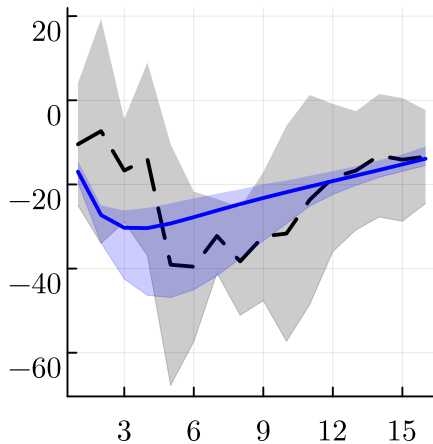


(b) Prices

Capital Destruction

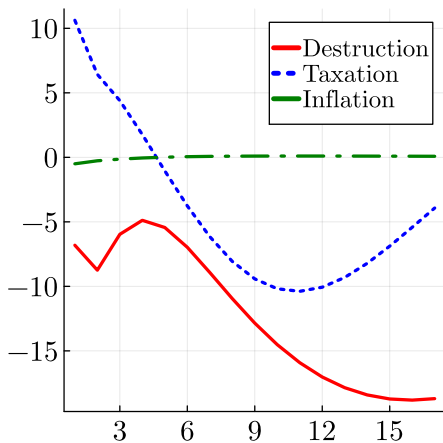


(a) Capital Stock

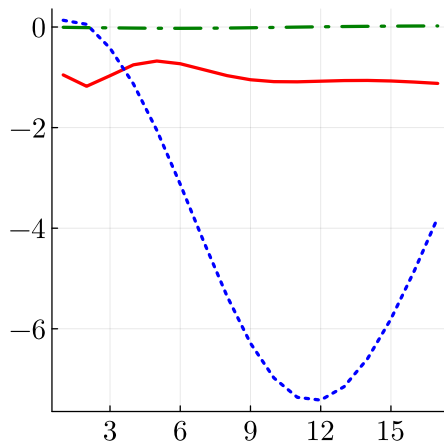


(b) Capital to Labor Share

Structural Decomposition: Contribution of shocks

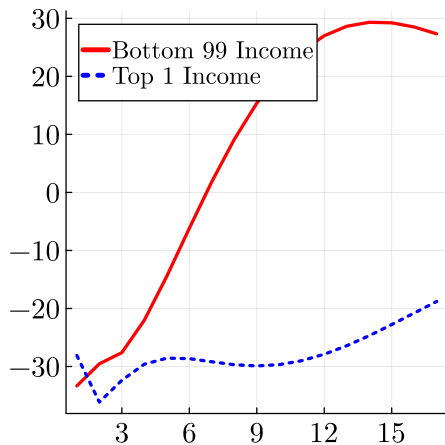


(a) Top 1 Income

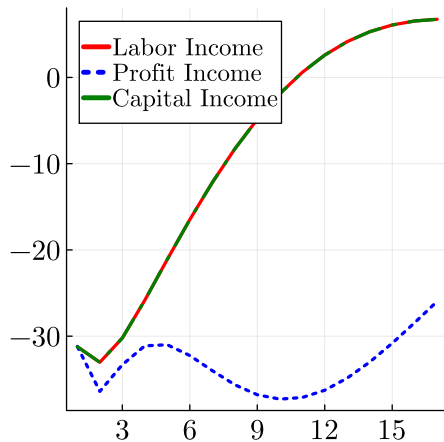


(b) Top 1 Wealth

Structural Decomposition: Introducing the profit channel



(a) Total Income



(b) Income Sources

Mechanism

Decline in capital-labor share caused by drop in profit

- Top-1 income share falls because profits/pure rents go largely to top incomes

Why profits fall: declining markups

- Prices increase less than costs/wages, Consistent with evidence [▶ See](#)
- Example Japan: Price controls to make '*producers bear sacrifices to cover the rise in production costs*' (Okazaki 1992)

External validation: profits fall strongly during/after war

New data collected from various sources—Index for profits (1938=100)

WW2	1935	1938	1941	1944	1949	1952
Finland	67.4	100.0	94.5	64.3	56.1	51.9
France	75.6	100.0	61.1	-8.3	115.5	124.6
Germany	61.2	100.0	81.3		2.1	15.8
Japan	59.3	100.0	149.3	186.0	33.9	94.2
Netherlands		100.0	138.0	16.0		
UK	68.7	100.0	95.4	71.6	96.3	110.6
WW1	1911	1913	1915	1917	1919	1919
France	71.1	100.0	21.7	59.6	58.2	65.2
Germany		100.0	76.0	41.0		

Also holds relative to GDP (decline in profits larger than decline in output) [▶ See](#)

Conclusion

- War drastically reduces income inequality, but has smaller effects on wealth inequality
- Destruction key/capital-labor share falls
- HANK model endogenizes declining capital share via profit response, thus accounting for decline in income inequality
- Todos:
 - Incorporate government consumption and debt
 - Understand large decline in inequality in the U.S.

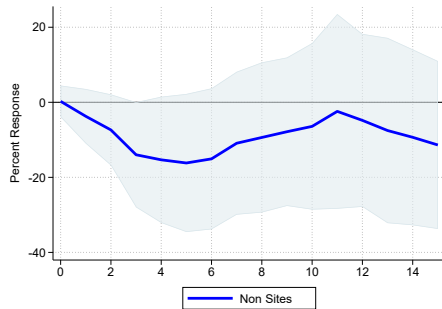
Appendix

Wars in Non-Sites

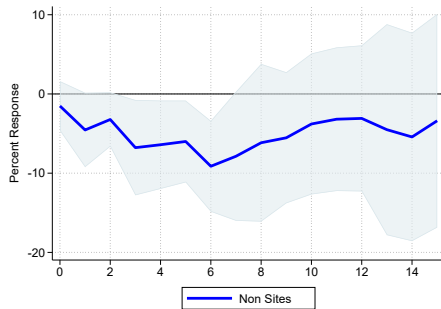
- What about belligerents involved in wars but not as war sites?
 - Can define belligerent countries using correlates of war
 - ▶ Note: In list below, not all countries have Inequality data (WW1 in AUS, CAN, NZ)
 - Study wars with > 10K casualties – otherwise find nothing (U.S. is always at war)
- Indeed, some leveling effects also in non-sites, but smaller than in war sites
 - Violent leveling vs peaceful leveling
 - ▶ Effects appear to be driven by the U.S. in WW2

Country	Year	Deaths (% Pop)	Country	Year	Deaths (% Pop)
Australia	1914	1.25%	New Zealand	1939	0.75%
Australia	1940	0.48%	U.K.	1914	1.97%
Canada	1914	0.83%	U.S.	1917	0.11%
Canada	1939	0.36%	U.S.	1941	0.30%
Japan	1904	0.17%	U.S.	1950	0.04%
New Zealand	1914	1.46%	U.S.	1965	0.03%

Income and Wealth Shares - Top 1%



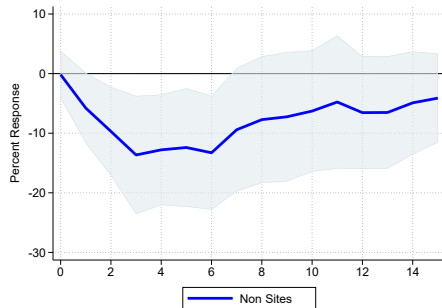
(a) Top 1 Income Share



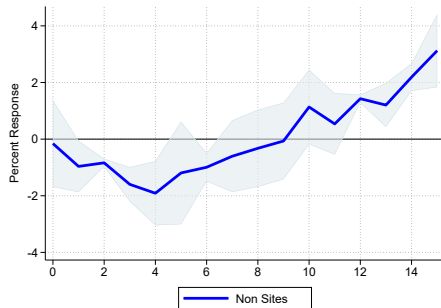
(b) Top 1 Wealth Share

Figure: Top 1% Income and Wealth Shares in Non-War Sites

Income and Wealth Shares - Top 10%



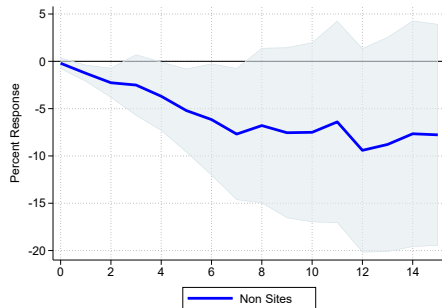
(a) Top 10 Income Share



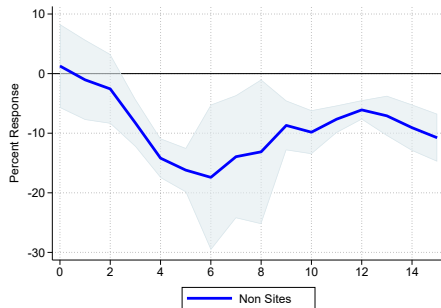
(b) Top 10 Wealth Share

Figure: Top 10% Income and Wealth Shares in Non-War Sites

Capital Stock and Capital/Labor Share



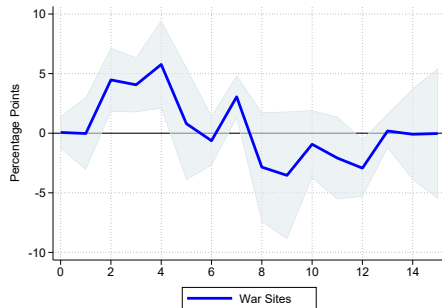
(a) Capital Stock



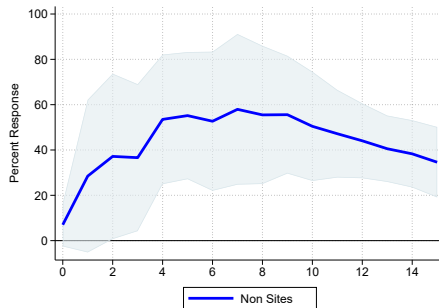
(b) Capital/Labor Share

Figure: Capital Stock and Capital/Labor Share in Non-War Sites

Inflation and Top Marginal Tax Rate



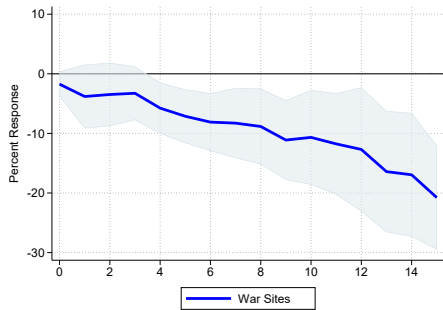
(a) Inflation



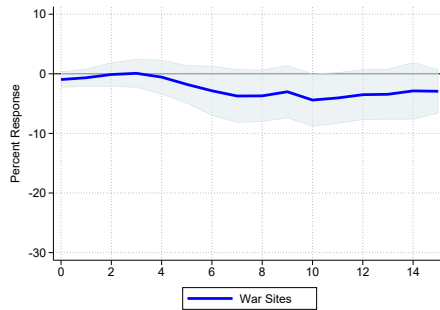
(b) Top Marginal Tax Rate

Figure: Inflation and Tax Rate in Non-War Sites

All Wars



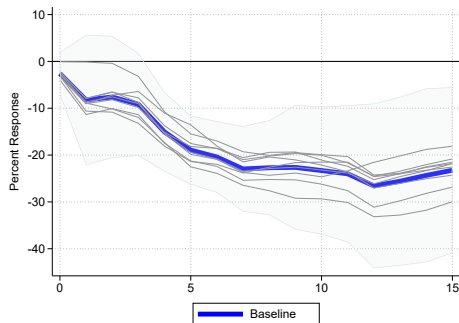
(a) Top 1 Income Share



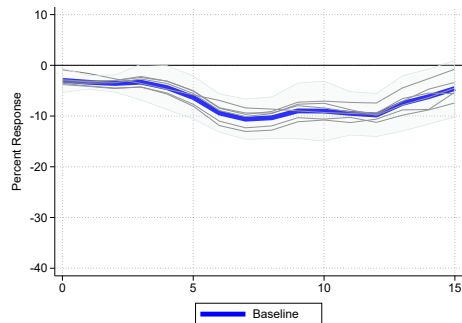
(b) Top 1 Wealth Share

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Dropping each war



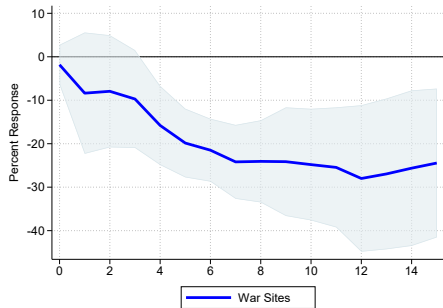
(a) Top 1 Income Share



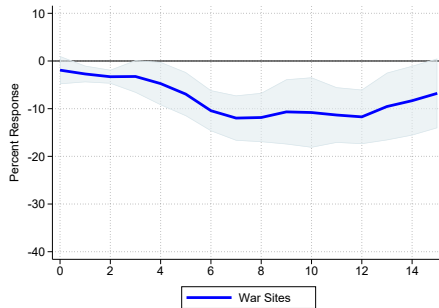
(b) Top 1 Wealth Share

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Alternative Interpolation



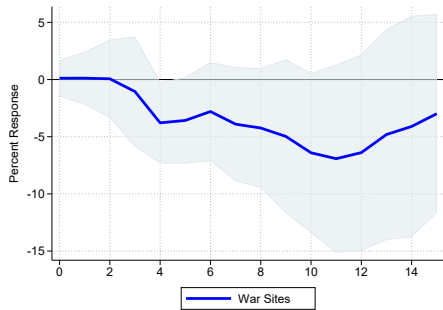
(a) Top 1 Income Share



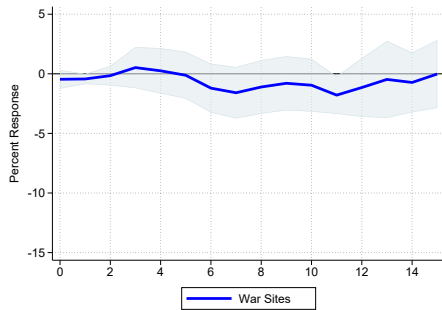
(b) Top 1 Wealth Share

Notes: Alternative Interpolation in which we assume that for missing data, the entire decline in inequality happens during the war (and top shares are flat before) [▶ Go Back](#)

Inequality at the Top Decile: Income vs Wealth



(a) Top 10 Income Share



(b) Top 10 Wealth Share

► Go Back

Wages vs. Prices

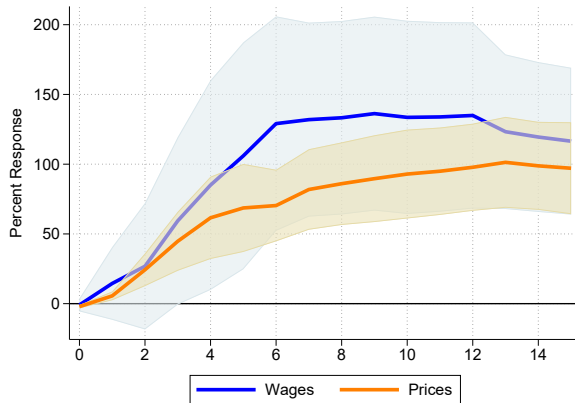
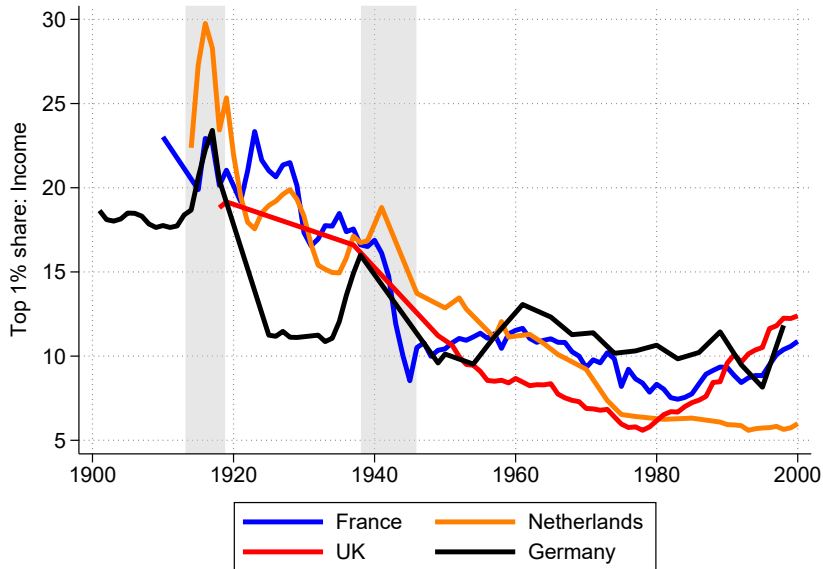
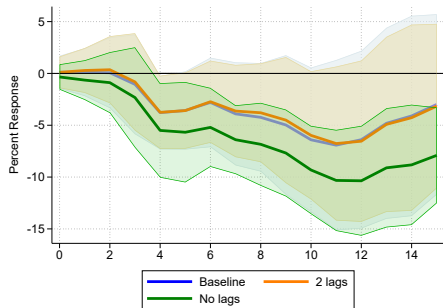


Figure: Wages and Prices in Response to War Shock

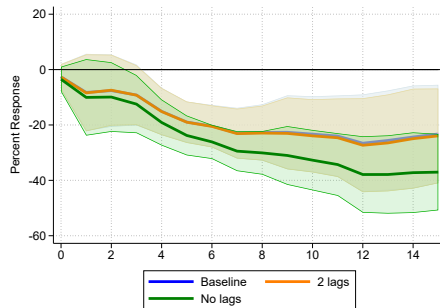
Examples



IRFs when excluding lags



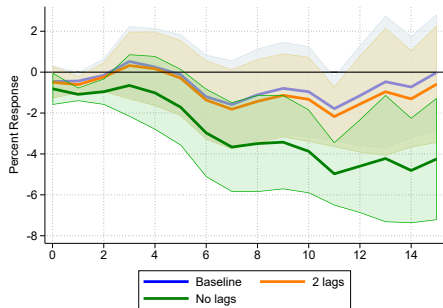
(a) Top Decile Share



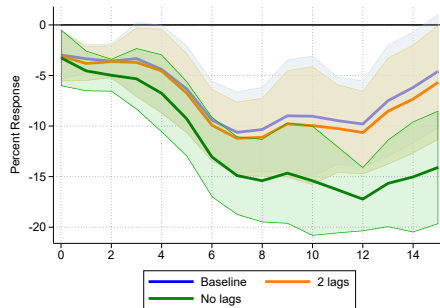
(b) Top Percentile Share

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IRFs when excluding lags



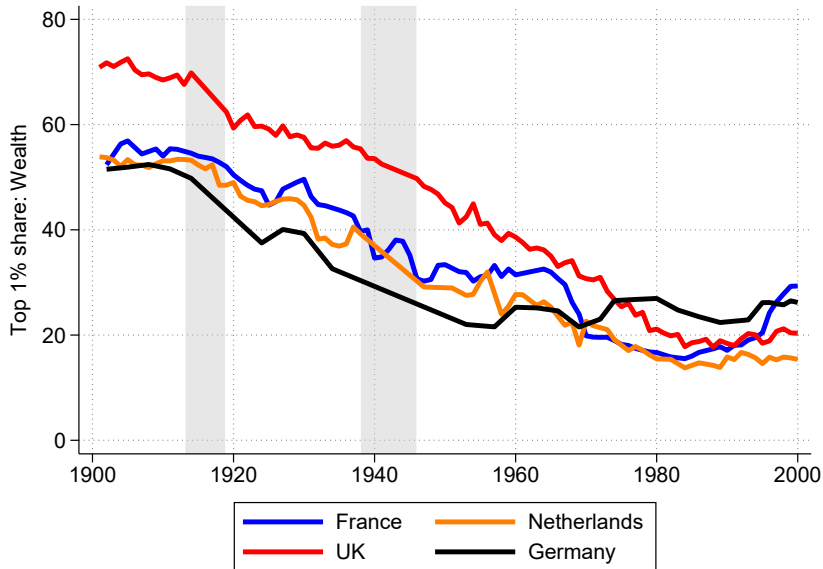
(a) Top Decile Share



(b) Top Percentile Share

► Go Back

Examples



Estimated Parameters

Table: Prior and Posterior Distributions of Estimated Parameters (Part 1)

Parameter	Distribution	Prior		Posterior			
		Mean	Std. Dev.	Mean	Std. Dev.	5 %	95 %
Capital Destruction Shock							
ρ_{D*}	Beta	0.50	0.20	0.97	0.01	0.95	0.98
ρ_{D2}	Normal	0.00	0.50	-0.95	0.03	-0.99	-0.90
σ_D	Inv.-Gamma	1.00	2.00	4.04	0.46	3.43	4.97
Tax Progressivity Shock							
ρ_{P*}	Beta	0.50	0.20	0.94	0.02	0.91	0.98
ρ_{P2}	Normal	0.00	0.50	-0.76	0.09	-0.92	-0.62
σ_P	Inv.-Gamma	1.00	2.00	23.85	9.65	9.36	40.72
Real and Nominal Frictions							
δ_S	Gamma	5.00	2.00	0.37	0.11	0.20	0.57
ϕ	Gamma	4.00	2.00	3.77	0.81	2.57	5.38
κ	Gamma	0.10	0.02	0.19	0.03	0.12	0.24
κ_W	Gamma	0.10	0.02	0.09	0.02	0.05	0.12
$SHIFT_{\pi}$	Beta	0.00	0.50	0.45	0.16	0.18	0.71

Notes: To estimate the AR(2)-processes for shocks to capital depreciation and tax progressivity, we estimate $\rho_{D*}/\rho_{P*} = \rho_{D1}/\rho_{P1} + \rho_{D2}/\rho_{P2}$ in addition to ρ_{D2}/ρ_{P2} . The standard deviation of both shocks is expressed in percent.

Estimated Parameters (Continued)

Table: Prior and Posterior Distributions of Estimated Parameters (Part 2)

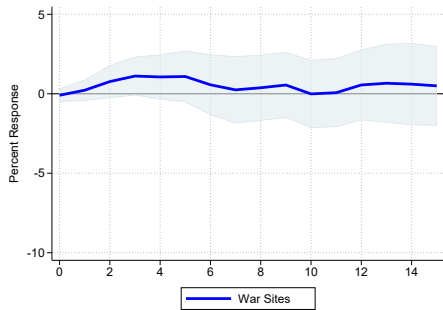
Parameter		Prior		Posterior			
	Distribution	Mean	Std. Dev.	Mean	Std. Dev.	5 %	95 %
Monetary and Fiscal Policy Rules							
ρ_R	Beta	0.75	0.20	0.93	0.02	0.90	0.96
θ_π	Normal	1.70	0.30	1.53	0.10	1.31	1.68
θ_Y	Normal	0.13	0.05	0.16	0.04	0.09	0.24
ρ_G	Beta	0.5	0.20	0.54	0.20	0.19	0.85
γ_{YG}	Normal	0.00	1.00	0.04	0.33	-0.48	0.57
γ_{BG}	Normal	0.00	1.00	0.09	0.04	0.04	0.16
ρ_τ	Beta	0.5	0.20	0.56	0.18	0.21	0.82
$\gamma_{Y\tau}$	Normal	0.00	1.00	-0.23	0.16	-0.48	0.08
$\gamma_{B\tau}$	Normal	0.00	1.00	0.61	0.28	0.22	1.15

Calibrated Parameters

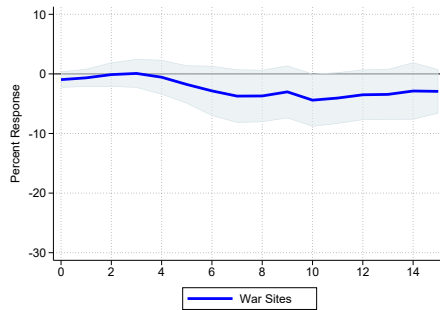
Table: Calibration (Annual Frequency)

Parameter	Value	Description	Target
Households: Income Process			
ρ_h	0.90	Persistence labor income	Storesletten et al. (2004)
σ_h	0.10	STD labor income	Storesletten et al. (2004)
ι	25.00%	Trans.prob. from E. to W.	Güvenen et al. (2014)
ζ	0.11%	Trans.prob. from W. to E.	Top 1% wealth share, 27%
Households: Preferences			
ξ	2.00	Relative risk aversion	Standard value
γ	2.00	Inverse of Frisch elasticity	Chetty et al. (2011)
β	0.96	Discount factor	Capital to output, $K/Y = 3.23$
λ	8.00%	Portfolio adj. prob.	Public debt, $B/Y = 0.56$
$\bar{R}$	8.00%	Borrowing penalty	Private debt $IOUs/Y = 0.21$
Firms			
α	0.66	Share of labor	Standard value
δ_o	7.50%	Depreciation rate	Standard value
$\bar{\eta}$	11	Elasticity of substitution	Price markup 10%
ζ	40	Elasticity of substitution	Wage markup 2.5%
Government			
τ	0.33	Tax rate level	Gov't expend. share, $G/Y = 22\%$
$\bar{R}^b$	1.00	Nominal rate	Growth $\approx$ interest rate,
$\bar{\pi}$	1.00	Inflation	Indexation

Wealth Inequality: Full Sample



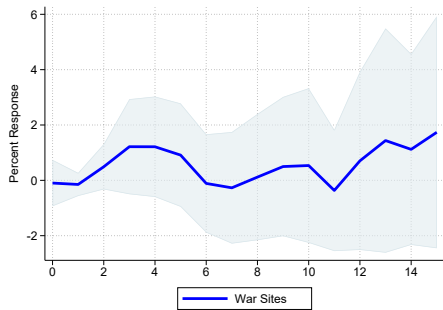
(a) Top Decile Share



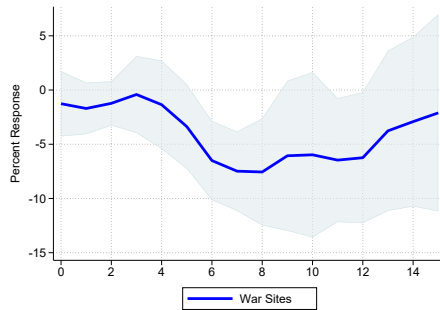
(b) Top Percentile Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Wealth Inequality: Different Interpolation



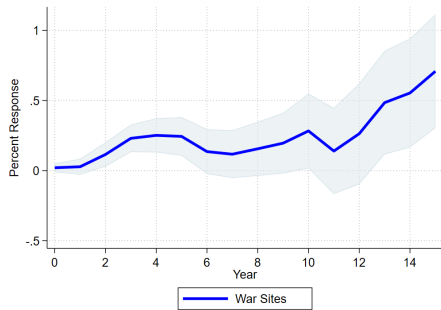
(a) Top Decile Share



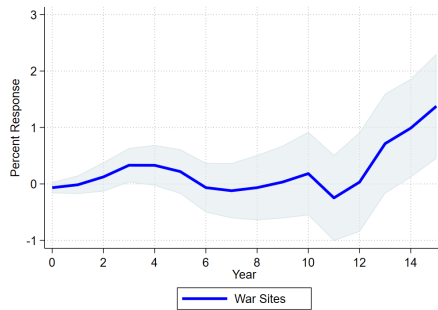
(b) Top Percentile Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Wealth Inequality: Quantitative Measure



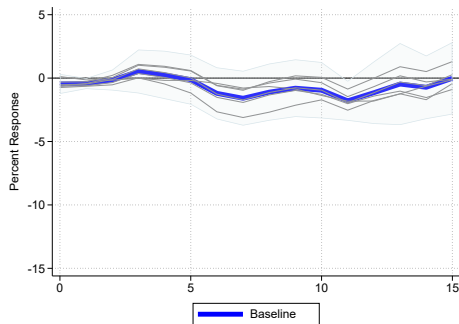
(a) Top Decile Share



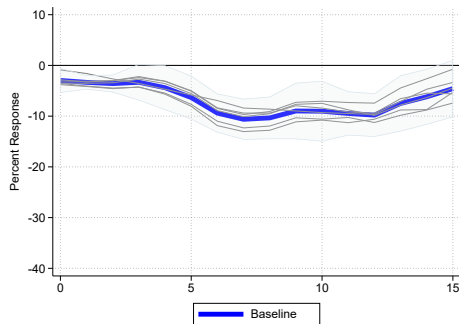
(b) Top Percentile Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Wealth Inequality: Drop Wars



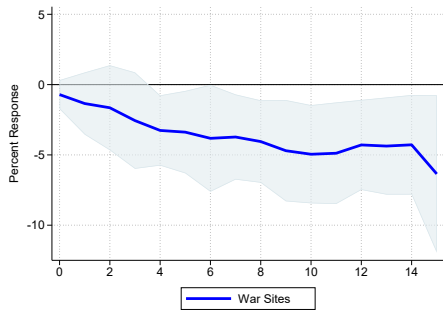
(a) Top Decile Share



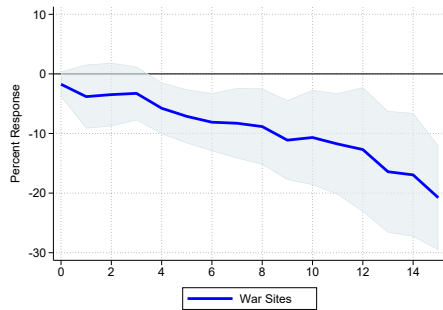
(b) Top Percentile Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Income Inequality: Full Sample



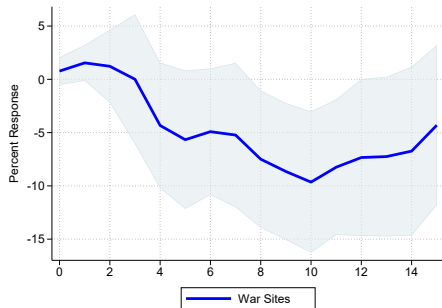
(a) Top Decile Share



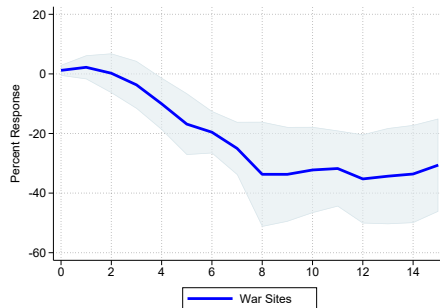
(b) Top Percentile Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Income Inequality: Different Interpolation



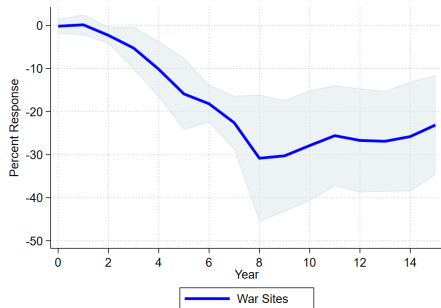
(a) Top Decile Share



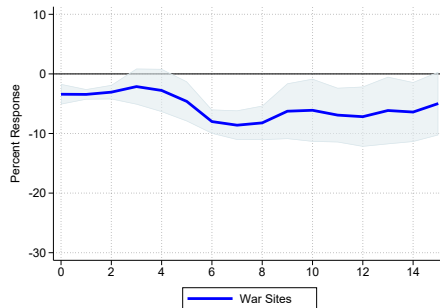
(b) Top Percentile Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Income Inequality: Quantitative Measure



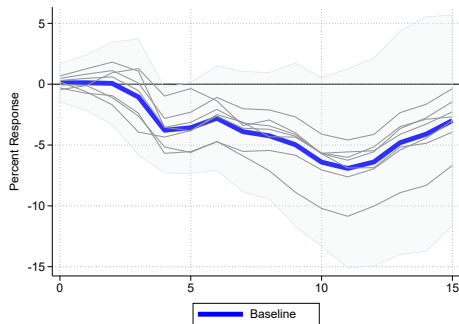
(a) Top 1 Income Share



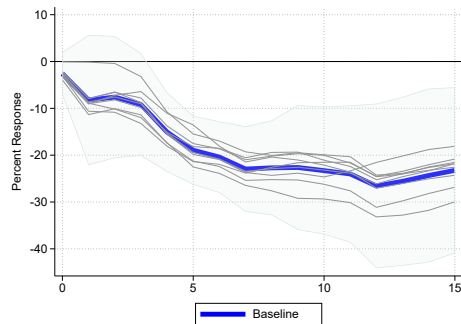
(b) Top 1 Wealth Share

Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Income Inequality: Drop Wars



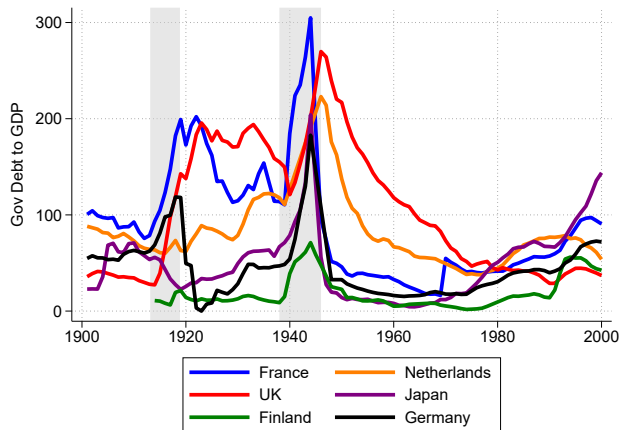
(a) Top Decile Share



(b) Top Percentile Share

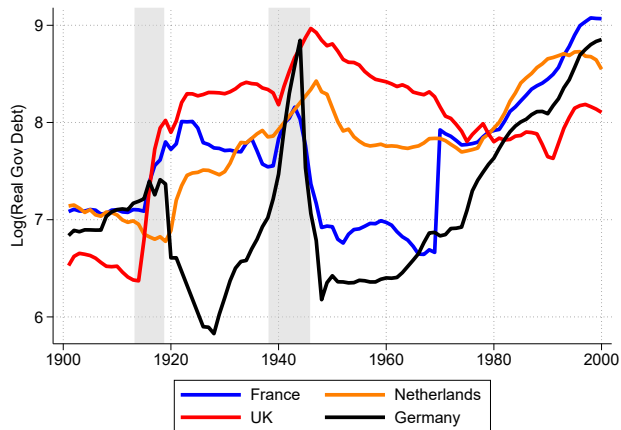
Notes: Shaded areas indicate 90% confidence intervals [▶ Go Back](#)

Many countries find themselves with less-debt post war than pre-war



Note: IRFs refer to real government debt

Log Real Gov Debt



Government Debt: Germany

The currency reform has been criticised mainly from the point of view of social justice. Social justice would have required that all property, whether in the form of cash, of claims, or of real assets, should be treated equally. Instead, the owners of real assets were favoured as compared with the holders of private claims in the form of loans or securities,² and the latter were in turn favoured as compared with the owners of bank deposits, which were reduced in a larger proportion than private claims; among the owners of liquid funds those were favoured who had little cash, since they obtained the “Kopfgeld” at the ratio of 1 : 1, whereas those with “sufficient” cash (including RM bank balances) lost at the ratio of 16 : 1. Worst of all fared the holders of claims against the Reich which were completely wiped out.

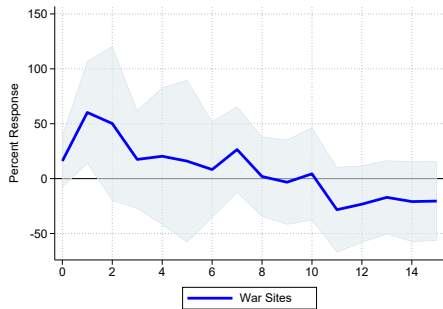
Figure: Lutz (1949)

Government Debt: Germany

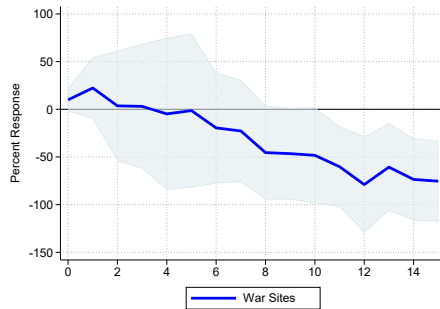
During World War II, public debt surged again, mostly because of the huge occupation payments imposed by Germany. Total payments amounted to more than 100% of pre-war GDP.²⁷³ About a third was financed with taxes, and the rest with bonds and money creation (e.g., Occhino, Oosterlinck and Whute, 2006, Table 3). As domestic production collapsed – in 1944, national income reaches its twentieth century trough, about 100bn 2010 euros – the public debt / national income ratio exploded and exceeded 250% by the end of the war. The immediate post-war inflation rapidly brought the debt down. By the end of the 1940s, it is less than 50% of national income

Figure: Piketty and Zucman (2014)

Government Spending and Debt



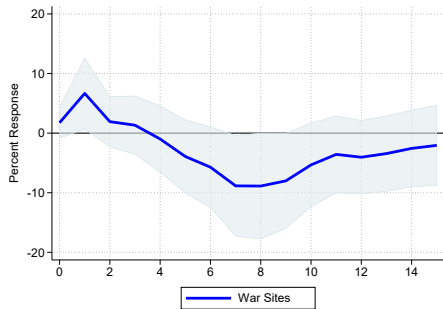
(a) Government Spending



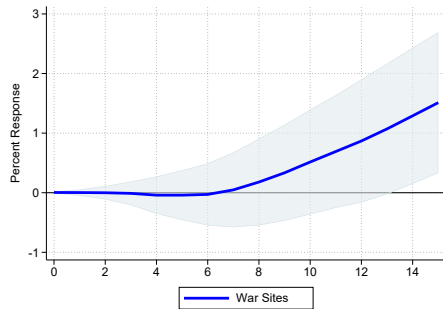
(b) Government Debt

Notes: Shaded areas indicate 90% confidence intervals

Labor force and population



(a) Total Hours



(b) Population

Notes: Shaded areas indicate 90% confidence intervals

► Go Back

Results Including Differential Destruction

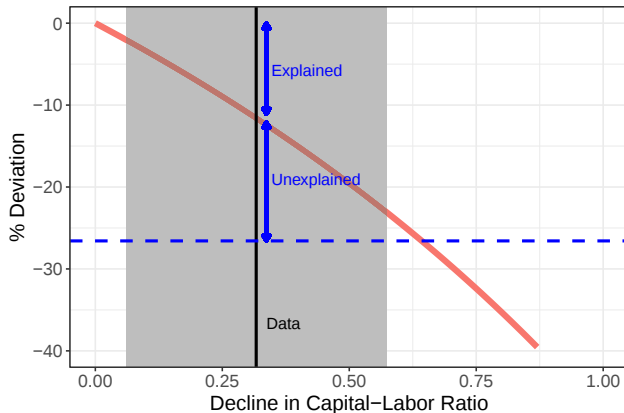
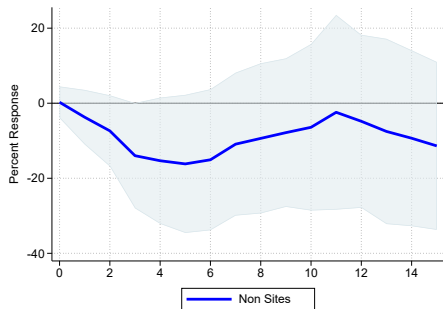


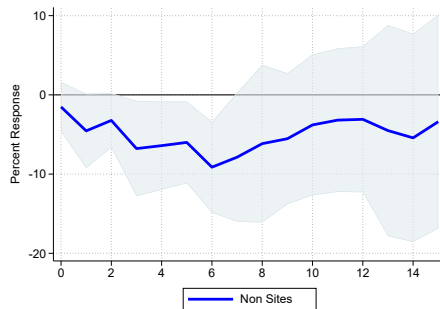
Figure: Including Differential Destruction

Notes: Here, assume that decline in capital for the top 1 exceeds the aggregate decline in capital shares by 10%, following our empirical estimates. [► Go Back](#)

Inflation Surges and Taxation becomes Progressive



(a) Top 1



(b) Top 1 Wealth Share

Notes: Shaded areas indicate 90% confidence intervals

► Go Back

Wages Rise More than Prices

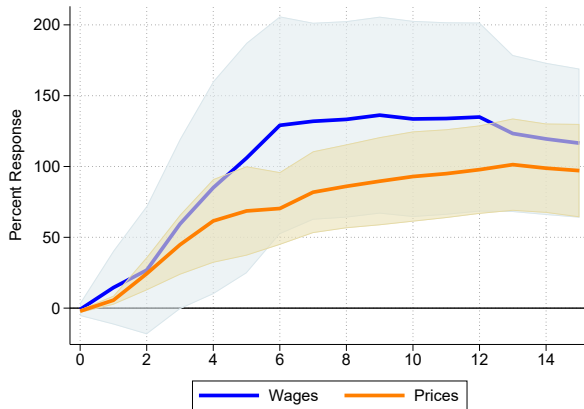


Figure: Response of Wages and Prices to the War Shock

Profits relative to GDP

Table: Index of Profits (over GDP)

WW2	1935	1938	1941	1944	1949	1952
Finland	87.3	100.0	98.0	53.0	39.0	26.0
France	99.8	100.0	87.3	-16.4	88.5	80.9
Germany	82.8	100.0	58.1		3.2	16.1
Japan	73.7	100.0	119.0	131.7	55.1	96.0
Netherlands		100.0	202.6	44.9		
UK	75.6	100.0	80.7	58.6	78.8	89.0
WW1	1911	1913	1915	1917	1919	1919
France	78.2	100.0	23.9	73.6	77.3	76.9
Germany		100.0	89.6	51.9		

Go Back [▶ Go Back](#)

- Aaberge, R. and Atkinson, A. B. (2010). Top incomes in norway. *Top incomes: A global perspective*, 2:448–480.
- Albers, T., Bartels, C., and Schularick, M. (2022). Wealth and its distribution in germany, 1895-2018. *CEPR Discussion Paper*, No. 17269.
- Alvaredo, F., Atkinson, A. B., and Morelli, S. (2018). Top wealth shares in the uk over more than a century. *Journal of Public Economics*, 162:26–47.
- Auray, S. and Eyquem, A. (2019). Episodes of war and peace in an estimated open economy model. *Journal of Economic Dynamics and Control*, 105:203–249.
- Barro, R. J. (2006). Rare Disasters and Asset Markets in the Twentieth Century. *The Quarterly Journal of Economics*, 121(3):823–866.
- Bartels, C. (2019). Top incomes in germany, 1871–2014. *The Journal of Economic History*, 79(3):669–707.
- Bengtsson, E. and Waldenström, D. (2018). Capital shares and income inequality: Evidence from the long run. *The Journal of Economic History*, 78(3):712–743.
- Braun, R. A. and McGrattan, E. R. (1993). The macroeconomics of war and peace. *NBER macroeconomics annual*, 8:197–247.

- Chetty, R., Guren, A., Manoli, D., and Weber, A. (2011). Are micro and macro labor supply elasticities consistent? A review of evidence on the intensive and extensive margins. *The American Economic Review*, 101(3):471–475.
- Farhi, E. and Gabaix, X. (2016). Rare disasters and exchange rates. *The Quarterly Journal of Economics*, 131(1):1–52.
- Gabaix, X. (2012). Variable rare disasters: An exactly solved framework for ten puzzles in macro-finance. *The Quarterly journal of economics*, 127(2):645–700.
- Garbinti, B., Goupille-Lebret, J., and Piketty, T. (2021). Accounting for wealth inequality dynamics: Methods, estimates and simulations for france. *Journal of the European Economic Association*, 19(1):620–663.
- Goldin, C. and Margo, R. A. (1992). The great compression: The wage structure in the united states at mid-century. *The Quarterly Journal of Economics*, 107(1):1–34.
- Gourio, F. (2012). Disaster risk and business cycles. *American Economic Review*, 102(6):2734–2766.
- Guvenen, F., Kaplan, G., and Song, J. (2014). How risky are recessions for top earners? *The American Economic Review*, 104(5):148–153.

- Heldring, L., Robinson, J. A., and Whitfill, P. (2022). The second world war, inequality and the social contract in britain. *Economica*, 89:S137–S159.
- Horn, S., Reinhart, C. M., and Trebesch, C. (2020). Coping with disasters: two centuries of international official lending. Technical report, National Bureau of Economic Research.
- Jordà, Ò., Schularick, M., and Taylor, A. M. (2017). Macrofinancial history and the new business cycle facts. *NBER macroeconomics annual*, 31(1):213–263.
- Moriguchi, C. and Saez, E. (2008). The evolution of income concentration in japan, 1886–2005: evidence from income tax statistics. *The Review of Economics and Statistics*, 90(4):713–734.
- Nakamura, E., Steinsson, J., Barro, R., and Ursúa, J. (2013). Crises and recoveries in an empirical model of consumption disasters. *American Economic Journal: Macroeconomics*, 5(3):35–74.
- Piketty, T. (2003). Income inequality in france, 1901–1998. *Journal of political economy*, 111(5):1004–1042.
- Piketty, T. and Saez, E. (2014). Inequality in the long run. *Science*, 344(6186):838–843.

- Roine, J. and Waldenström, D. (2015). Long-run trends in the distribution of income and wealth. *Handbook of income distribution*, 2:469–592.
- Saez, E. and Zucman, G. (2016). Wealth inequality in the united states since 1913: Evidence from capitalized income tax data. *The Quarterly Journal of Economics*, 131(2):519–578.
- Storesletten, K., Telmer, C. I., and Yaron, A. (2004). Cyclical dynamics in idiosyncratic labor market risk. *Journal of Political Economy*, 112(3):695–717.
- Toussaint, S., de Vicq de Cumptich, A., Moatsos, M., and van der Valk, T. (2022). Household wealth and its distribution in the netherlands, 1854-2019. *World Inequality Lab Working Paper*, 19.
- Ursua, J. F. and Barro, R. J. (2010). Barro-ursua macroeconomic data.